

Serial No. 09/880,514

CLAIMS

Claims 25-28, 32-53, and 61-74 are cancelled. Claims 75-88 are added.

Claims 1 - 24 (cancelled)

25. (cancelled) A method of coating a medical device, comprising:

thermally spray-forming material onto the medical device to form a coating where the type of thermal spray processing is selected from the group consisting of cold spray, combustion, high velocity oxygen fuel and plasma and where the material forming the coating is selected from the group consisting of metals, metal alloys, polymers, ceramics, cermets and metal/polymer composites.

26. (cancelled) The method of claim 25, wherein the thickness of the coating is varied on the medical device.

27. (cancelled) The method of claim 25, wherein the thickness of the coating is varied along a length of the medical device.

28. (cancelled) The method of claim 25, wherein metallic alloys are sprayed onto the medical device to form the coating.

29. (cancelled) The method of claim 25, wherein ceramic materials are sprayed onto the medical device to form the coating.

Serial No. 09/880,514

30. (cancelled) The method of claim 25, wherein thermally spray-forming material onto the medical device includes coating the medical device with a composite material.

31. (cancelled) The method of claim 25, wherein polymers are coated onto the medical device.

32. (cancelled) The method of claim 25, further comprising heat treating the coating formed from the thermal spray-forming of a metal material to grow the grain size of the coating.

33. (cancelled) The method of claim 25, further comprising swaging the medical device after thermally spray-forming material onto the medical device.

34. (cancelled) The method of claim 25, wherein the medical device is drawn after the coating is formed.

35. (cancelled) The method of claim 34, wherein the medical device is annealed after the coating is formed.

36. (cancelled) The method of claim 25, wherein the medical device is heated for post-processing after the coating is formed.

37. (cancelled) The method of claim 25, wherein after the coating is formed, the medical device is cross-link processed.

Serial No. 09/880,514

38. (cancelled) The method of claim 25, wherein after the coating is formed, the medical device is post processed in a traveling ring furnace where the material is melted and resolidified as the ring travels the length of the medical device.

39. (cancelled) The method of claim 25, further comprising processing the medical device in a vacuum and under high mechanical pressure so as to sinter the material forming the coating.

40. (cancelled) The method of claim 25, wherein after the coating is formed, an outer diameter of the medical device is post processed through centerless grinding.

41. (cancelled) The method of claim 25, wherein after the coating is formed, an outer diameter of the medical device is post processed by drawing to reduce the coating thickness.

42. (cancelled) The method of claim 25, wherein after the coating is formed, an inner diameter of the medical device is post processed by boring for improving both dimension and surface roughness.

43. (cancelled) A method of coating an intravascular stent through cold spray thermal processing, comprising:

introducing particles of a powder of at least one first material selected from the group consisting of metals, metal alloys, and polymers with a particle size from about 1 to 64 microns,

Serial No. 09/880,514

into a gas selected from the group consisting of Nitrogen (N₂), Oxygen (O₂), Air, Helium (He), Argon (Ar), Xenon (Xe), or Carbon Dioxide (CO₂);

introducing the gas and particles into a supersonic nozzle with an inlet temperature between 380 to 420° Celsius, at an inlet velocity from about 300 to about 1,200 m/sec, and an inlet pressure of 1.5 to 2.5 Mpa to form a high pressure stream;

directing the high pressure stream at a stent placed on a mandrel 8 to 10 mm away from the nozzle, the stent formed from a second material selected from the group consisting of a metal, an alloy and a polymer, and coating the stent with the particles to form a coated stent; and removing the coated stent from the mandrel.

44. (cancelled) A method of coating a medical device, comprising:

providing a medical device;

providing a coating material containing a metal alloy; and

applying the coating material to the medical device using a thermal spray process

wherein the type of thermal spray process is selected from the group consisting of cold spray, combustion, high velocity oxygen fuel, and plasma.

45. (cancelled) The method of claim 44, wherein providing the medical device comprises forming the medical device from a material comprising a second metal alloy.

46. (cancelled) The method of claim 45, wherein providing the medical device comprises forming the medical device as a near-net shaped device.

Serial No. 09/880,514

47. (cancelled) The method of claim 46, wherein providing the medical device comprises forming the medical device into a stent.

48. (cancelled) The method of claim 47, wherein providing the medical device comprises forming the stent from 316L stainless steel.

49. (cancelled) The method of claim 48, wherein the coating material comprises 316L stainless steel.

50. (cancelled) The method of claim 49, wherein applying the coating material forms a stainless steel coating having an average grain size of less than thirty-two microns.

51. (cancelled) The method of claim 49, wherein applying the coating material forms a stainless steel coating having an average grain size of less than twenty-two microns.

52. (cancelled) The method of claim 49, wherein applying the coating material forms a coating having porosity.

53. (cancelled) The method of claim 49, wherein the coating material comprises 316L stainless steel in the form of a powder.

54. (cancelled) The method of claim 53, wherein applying the coating material includes using a cold spray process.

Serial No. 09/880,514

55. (cancelled) The method of claim 53, wherein applying the coating material includes using a combustion thermal spray process.

56. (cancelled) The method of claim 53, wherein applying the coating material includes using a high velocity oxygen fuel thermal spray process.

57. (cancelled) The method of claim 53, wherein applying the coating material includes using a plasma spray process.

58. (previously presented) A method of coating a medical device, comprising:
providing a medical device;
providing a coating material containing a metal alloy; and
using cold spray thermal processing to apply a variable thickness coating of the metal alloy onto the medical device.

59. (previously presented) The method of claim 58, further comprising varying the thickness of the metal alloy coating along a length of the medical device.

60. (previously presented) The method of claim 58, wherein providing the medical device comprises forming the medical device into a stent.

61. (cancelled) A method of coating a medical device, comprising:

Serial No. 09/880,514

providing a medical device;
providing a coating material containing a metal alloy; and
using a cold spray process to apply a coating of the metal alloy onto the medical device
such that the coating has an average grain size of less than thirty-two microns.

62. (cancelled) The method of claim 61, wherein using a cold spray process forms a
metal alloy coating having an average grain size of less than twenty-two microns.

63. (cancelled) The method of claim 61, wherein providing the medical device comprises
forming the medical device into a stent.

64. (cancelled) A method of coating a medical device, comprising:
forming a metal alloy coating onto a medical device using a thermal spray process
selected from the group consisting of cold spray, combustion, high velocity oxygen fuel, arc, and
plasma; and
processing the medical device in a traveling ring furnace where the metal alloy coating is
melted and re-solidified as the ring travels the length of the medical device.

65. (cancelled) A method of coating a medical device, comprising:
forming a metal alloy coating onto a medical device using a thermal spray process
selected from the group consisting of cold spray, combustion, high velocity oxygen fuel, arc, and
plasma; and
centerless grinding an outer diameter of the metal alloy coated medical device.

Serial No. 09/880,514

66. (cancelled) A method of coating a medical device, comprising:

forming a metal alloy coating onto a medical device using a thermal spray process selected from the group consisting of cold spray, combustion, high velocity oxygen fuel, arc, and plasma; and

drawing the medical device so as to reduce a thickness of the metal alloy coating.

67 (cancelled) A method of coating a medical device, comprising:

coating a metal alloy onto an inner diameter of a medical device using a thermal spray process selected from the group consisting of cold spray, combustion, high velocity oxygen fuel, arc, and plasma; and

boring the inner diameter of the metal alloy coated medical device so as to improve both dimension and surface roughness.

68. (cancelled) A method of coating a medical device, comprising:

forming a medical device from a first metal alloy;
providing a coating material containing a second metal alloy; and
applying the coating material to the medical device, wherein a thermal spray process is used.

69. (cancelled) The method of claim 68, wherein providing the medical device comprises forming the medical device as a near-net shaped device.

Serial No. 09/880,514

70. (cancelled) The method of claim 68, wherein providing the medical device comprises forming the medical device into a stent.

71. (cancelled) A method of coating a medical device, comprising:
providing a medical device;
providing a coating material containing a metal alloy, wherein the coating material comprises 316L stainless steel; and
applying the coating material to the medical device to form a stainless steel coating having an average grain size of less than thirty-two microns, wherein a thermal spray process is used.

72. (cancelled) A method of coating a medical device, comprising:
providing a medical device;
providing a coating material containing a metal alloy, wherein the coating material comprises 316L stainless steel in the form of a powder; and
applying the coating material to the medical device, wherein a thermal spray process is used.

73. (cancelled) A method of coating a medical device, comprising:
providing a medical device;
providing a coating material containing a metal alloy; and
applying the coating material to the medical device using a thermal spray process, wherein the type of thermal spray process is selected from the group consisting of high velocity

Serial No. 09/880,514

oxygen fuel and plasma.

74. (cancelled) The method of claim 25, wherein the medical device comprises a stent.

75. (new) The method of claim 58, wherein the thickness of the coating is varied along a length of the medical device.

76. (new) The method of claim 58, wherein the coating material further comprises ceramic material.

77. (new) The method of claim 58, wherein the coating material comprises a composite material.

78. (new) The method of claim 58, wherein polymers are coated onto the medical device.

79. (new) The method of claim 58, further comprising heat treating the coating formed from the thermal spray-forming of the metal alloy to grow the grain size of the coating.

80. (new) The method of claim 58, further comprising swaging the medical device after thermally spray-forming material onto the medical device.

81. (new) The method of claim 58, wherein the medical device is drawn after the coating is formed.

Serial No. 09/880,514

82. (new) The method of claim 58, wherein the medical device is annealed after the coating is formed.

83. (new) The method of claim 58, wherein the medical device is heated for post-processing after the coating is formed.

84. (new) The method of claim 58, wherein after the coating is formed, the medical device is post processed in a traveling ring furnace where the material is melted and resolidified as the ring travels the length of the medical device.

85. (new) The method of claim 58, further comprising processing the medical device in a vacuum and under high mechanical pressure so as to sinter the material forming the coating.

86. (new) The method of claim 58, wherein after the coating is formed, an outer diameter of the medical device is post processed through centerless grinding.

87. (new) The method of claim 58, wherein after the coating is formed, an outer diameter of the medical device is post processed by drawing to reduce the coating thickness.

88. (new) The method of claim 58, wherein after the coating is formed, an inner diameter of the medical device is post processed by boring for improving both dimension and surface roughness.